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WHITE RIVER SHALE OIL CORPORATION

SUITE 500 PRUDENTIAL BUILDING, 115 SOUTH MAIN STREET
SALT LAKE CITY, UTAH 84111
(801) 363-1170

September 8, 1982

Mr. Tom Tetting
Utah Division of Oil, Gas and Mining
State Office Building, Room 4241
Salt Lake City, UT 84114

Dear Mr. Tetting:

In accordance with the Utah Division of Oil, Gas and Mining's Conditional Approval for the White River Shale Oil Corporation's (WRSOC) Phase I Operations, enclosed for your review is WRSOC's subsidence mitigation plan. This plan was prepared by Mr. Lowell B. Page, WRSOC's Mining Manager.

If you have questions concerning this plan, please feel free to call for assistance.

Sincerely,



Ralph A. DeLeonardis
Permits Coordinator

Enclosure

RAD/mjd

cc: P. A. Rutledge - OSO
J. W. Smith, Jr. - DOGM

WHITE RIVER SHALE OIL CORPORATION

SUBSIDENCE PROGRAM

Subsidence, as it relates to the mining of Tracts Ua and Ub, has been a subject for consideration since the federal leases were first acquired. One of the stipulations made part of the lease provides that there not be surface subsidence as a result of tract activities. The approved White River DDP contains sections that refer to the design of the mining system such that there will be negligible subsidence at the surface and also references to methods of monitoring for the possibility of subsidence. The approved White River monitoring manual also contains references to subsidence monitoring and is consistent with the lease stipulations and the approved DDP. In all of the above cases the reference to subsidence is to the surface topography of Ua and Ub and not the immediate underground mine roof and pillar conditions.

During the original core drilling program for evaluation of the shale deposits on Ua and Ub, a significant portion of the work was devoted to rock mechanics. A contract for test work was completed with the Bureau of Mines and a large number of core samples were analyzed at their laboratory in Denver. From this analytical data along with experience derived from actual mining conditions in the Colorado deposits, much of the rock characteristics for the underground mine design were developed. These included pillar strengths at various dimensions and mining heights, rock beam strengths at various mining widths and roof bolting patterns and safety factors of the roof at intersections with various dimensions. The two constants in these calculations were that surface subsidence would be negligible and that the mine roof would be stable. From this work over a period of time, the present mine layout has evolved.

White River does recognize, however, that even after this great amount of engineering, underground geologic conditions could be different than those anticipated and that surface subsidence could take place after mining. For this reason, the surface subsidence monitoring program was proposed and will be installed, and also there will be a plant pillar under the surface facilities. From experience at other mining properties where mining is reflected as subsidence on the surface, the White River proposed monitoring program will give early and

continuous data on both vertical and lateral ground movement should it occur. White River also plans to monitor in the underground mine with various measuring points in the roof, floor and pillars to detect changes in rock stress. One of the early projects, as soon as underground access is available, will be to do some over-coring work to determine the present insitu regional stress fields as they exist prior to significant mining in the Ua and Ub tracts. This will give White River base control to measure against the underground monitoring program.

In the present mine design program, White River is attempting to remain as flexible as possible in both the mine layout plan and the selection of the mining equipment so that should unforeseen conditions dictate, White River will be able to make changes in some of its mining and design parameters to compensate for these. In the case of surface subsidence, should this eventually prove to be a problem, White River will have the option to make significant changes to the mine plan which would reduce or prevent further subsidence as mining progresses. One option will be to change the pillar configuration and the room width dimensions which, in most cases, will solve the problem. Another change that can be incorporated to the mine plan is a change of direction of the mining to take advantage of the regional stress fields and geology. These two changes should solve any surface subsidence problems that exist.

Should surface subsidence occur and result in open cracks or minor faulting that is a hazard, then White River's immediate mitigating measures would consist of filling in the cracks, leveling the faulted areas and revegetating the disturbed surface. This is an extremely unlikely case since the mine design has been strongly oriented to the conservative side in an effort to specifically prevent such happenings. The surface monitoring program will give significant advance warning of any surface subsidence movement and the underground rock mechanics measurement program of monitoring rock stress immediately upon mining should give White River early data upon which to base both surface and underground subsidence projections so that remedial action can be taken. White River is committed to constructing and operating a safe and productive mining operation with a minimum of environmental disturbance and a maximum recovery of the economic oil shale reserves.